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DEVICE CONTROLLABLE BY A SEQUENTIALLY NAVIGATED MENU AND METHOD OF  
SEQUENTIAL CONTROL

[Über ein sequentiell zu durchlaufendes Menü steuerbare Vorrichtung  
und Verfahren zur sequentiellen Menüsteuerung]

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(57)

The navigation of hierarchical menu controls that are to be passed through sequentially, for communications terminal devices and other menu-controlled devices, is facilitated by a menu selection object that effects a direct jump to the next menu selection object of the next highest level.

#### Description

Numerous devices such as telephones, fax machines, and other communications terminal devices, but also various devices outside communications technology are presently controlled by menus that are to be proceeded through sequentially. These devices generally have a display device for displaying menu selection objects (menu items), a device for choosing (selection) an indicated menu selection object, and a device for effecting a transition (scrolling) to a subsequent menu selection object. Menu selection objects are sometimes called menu items, as well. They may be indicated by alphanumeric or iconographic symbols. This is of no significance for the present invention.

It is typical of such devices that the display device shows a single menu selection object at a time and that the user selects an indicated menu selection object, e.g. with the help of one or more buttons, and in this way activates a corresponding function of the device or goes to a subsequent menu selection object, etc. In complex devices of this kind, the menus are hierarchically structured in the form of a tree structure of menu lists in each level of the hierarchy. Each menu list comprises menu selection objects which, in turn, can be

menu lists.

Menu controls of this kind have the advantage that offer guidance to a user who is unfamiliar or insufficiently familiar with the device, in principle making possible use of the device to any user, even without previous knowledge. For this purpose, the user looks sequentially, in a simple manner, for a menu selection object appropriate for his special situation and selects this object.

However, with complex hierarchical menu controls this search can quickly become quite inconvenient, if a user who is unfamiliar with the device must look through numerous menus and submenus or if he accidentally jumps over a menu item he wished to select instead of selecting it, which he actually meant to do, since with known devices with menu controls of this kind it is possible to change to another menu list only by passing through all the menu hierarchy above. Thus, the user must "start over at the top each time," i.e., after searching through a menu list -- e.g. by selecting a corresponding menu selection object or by operating a button provided especially for this purpose -- he must jump back to the beginning (the first menu selection object on the top hierarchical level) and, from there, work his way once again through the tree structure to another menu list.

The object of this invention is to improve this situation, i.e., to produce a menu control with which searching in hierarchical menu lists is possible in a convenient manner, without having to pass through significant portions of the tree menu structure again, in

order to change from one menu list to another menu list. This object is achieved with a device that is controllable over a menu to be passed through sequentially, having the characteristics recited in Claim 1. By using the device of this invention, the user has the advantageous possibility, after looking through a menu list, of jumping directly to the next menu list by selecting a corresponding menu selection object of this invention, without having to go to the top menu and passing from there through the tree structure to this menu list. Thus, navigation in hierarchical menu controls that are to be passed through sequentially for communications terminal devices and other menu-controlled devices is facilitated by a menu selection object that effects a direct jump to the next menu selection object of the next highest level.

Advantageous refinements of the invention are the subject matter of additional Claims.

Figure 1 shows schematically a simple sample menu of three menu lists, each with three menu selection objects, in accordance with the prior art.

Figure 2 shows possible ways through the menu shown in Fig. 1.

Figure 3 shows schematically a menu in accordance with the present invention that is expanded by one menu selection object for making a direct jump to the next menu list.

Figure 4 shows possible ways through the menu in Fig. 3, in

accordance with the present invention.

Figure 5 shows the hierarchical tree structure of the sample menu of Fig. 3.

Figure 6 shows schematically a data set of a data structure in accordance with a preferred exemplary embodiment of the present invention.

Figure 7 shows schematically a data structure in accordance with a preferred exemplary embodiment of the present invention.

At the end of the description a computer program is presented for implementing the preferred embodiment of the present invention.

Below, the invention will be explained in greater detail using the figures and with the help of preferred exemplary embodiments.

Below, we will describe an improved menu control for devices with sequential menu control that facilitates navigation in hierarchically structured menu structures. If the user of a conventional menu control selects a certain menu list, he cannot move (scroll) directly to the next menu list. Thus, if the user of such a device makes a mistake or does not know in which menu list the menu selection object (menu item) he wants is located, he is forced to look through all the menu lists one after the other and, in each case, from the top, i.e., beginning at the top level of the menu hierarchy.

With the present invention, the user is able to search through a hierarchical menu structure sequentially and, thus, to search through

all menu lists one directly after the other. This is always advantageous if a menu structure consists of nested menu lists that, for example, can be gone through only sequentially, due to display limitations on the device. This is the case, for example, on menu-controlled communications terminal devices, such as menu-controlled telephones or fax machines.

A hierarchical menu structure consists of menu lists having menu selection objects which, in turn, can be additional menu lists. This produces a tree structure of nested menu lists. Figure 1 shows schematically one example of such a menu, consisting of three menu lists made in a conventional manner. If a user wishes to search through this menu structure for a menu selection object suitable for his purposes to reach, for example, menu selection object C3, he must go through all three lists (A, B, C) one after the other and, following each perusal of a list, return to the top hierarchical level, go from there to the next unexamined list, then return from the end of it, etc. Figure 2 shows possible paths through the menu of Fig. 1. Here, the symbol ">" stands for the transition to the next menu selection object and the symbol "OK" indicates selection of a menu selection object. Obviously, this type of search quickly becomes difficult in complex hierarchical menu structures.

In accordance with the present invention, each menu list is expanded by a new type of menu selection object ("next menu list, the

choice (selection) of which effects a direct transition (scroll), i.e., a direct jump, to the next menu list. Figure 3 shows schematically a menu in accordance with the present invention that has been expanded by one menu selection object for a direct jump to the next menu list. Figure 4 shows possible paths through the menu of Fig. 3, in accordance with the present invention. Figure 5 shows the hierarchical tree structure of the sample menu of Fig. 3. Thus, with the menu structure of this invention it is no longer necessary to make the transition from one menu list to the next by way of a detour to the top hierarchical level of the menu structure. This advantageous effect of this invention may be seen directly in Fig. 4.

If a user wishes to move, for example, from menu list B to menu list C, he simply selects for this purpose the menu selection object "next menu list" on menu list B and moves directly to the beginning (the first menu selection object) of menu list C. In the conventional menu structure of Fig. 1, he would first have had to select the menu selection object "End" of menu list B to go to the beginning of the entire menu structure -- i.e., in this case back to menu selection object "Menu List A" -- and from there through menu selection object "Menu List B" to menu selection object "Menu List C" and finally, by selecting this menu selection object "Menu List C" to menu list C.

The overall menu structure of this invention may be shown using a common tree structure familiar to those skilled in the art, as in Fig.



5, using the menu structure in Fig. 3 as an example. Here, the starting point (also known as the main menu) is the root or trunk of the tree and the individual (primitive) menu selection objects that, in turn, do not represent menu lists, are the leaves on the tree. Each branch of the tree can contain several hierarchical levels and an identification number can be assigned to each node on a branch, clearly identifying this node within a hierarchical level. In the example in Fig. 5, there are three levels:

- the first level, the root (root [in English]) of the tree, consisting of only one menu list, the main menu (main menu [in English]);

- the second level, consisting of 3 menu items, each of which in this case is, in turn, a menu list, namely the menu lists A, B, and C;

- the third level, which in this case comprises 15 primitive menu selection objects, the leaves of the tree.

In general, of course, menu lists and primitive menu items may occur beside one another on the same level. Of course, the leaves of the tree are always primitive menu items.

When moving (scrolling) through a menu structure of this kind, the current path (current path [in English]) is always followed (tracking). Each time the menu selection object "next menu list" is activated (i.e., selected), the next menu selection object of the next highest level, i.e., the next menu list if this menu selection object is a menu list, is shown. Those skilled in the art immediately

recognize that, instead of the next menu selection object of the next highest level, the previous one may be provided as the destination of the jump. Both measures can be implemented in a single embodiment of the present invention, e.g., with the help of two buttons: ">" and "<."

If the user selects, for example, the menu selection object "next menu list" with the number 1-1-4 (Fig. 5), then a jump to menu selection object 1-2 ( $1-(1+1)$ ) takes place, i.e., in this case to the menu list "Menu List B". If there is no subsequent menu item of this (next higher) level, then the program jumps to the level above. Thus, for example, if the user is in menu list C and selects menu item 1-3-4 "next menu list," there is no next menu item on the second level. Then the same process is used on the level above, optionally until the last menu item on the top level is reached. If this is the case, then the menu is cyclically expanded (wrapping around), i.e., the first menu selection object is shown, in the example this is menu item 1-1 ("Menu List A").

For implementing the present invention in devices with common facilities for storing and processing data, the menu structure is preferably represented with the help of a data structure with which the menu items are easily addressable in each direction. This permits quick exchange of the menu items and a simple path sequence through the menu structure. The tree structure of Fig. 5 can advantageously be implemented with the data set structure shown in Fig. 6 and a tree

data structure based on it, as seen in Fig. 7. In this way, each menu selection object of a menu list has assigned to it a data set, which includes the menu selection object data, a pointer to the data set of the hierarchically next higher menu list, a pointer to the data set of the next menu selection objects, and -- if this menu selection object is, in turn, a menu list -- a pointer to the data set of the first menu selection object of the current menu list. Pointers to objects that are not present are expediently assigned the null pointer (null pointer [in English]).

This invention can also be implemented with the help of the computer program below, the "Next Menu List":

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NODE *current_nodeptr;

switch (selected menu item)

case ...

case 'next menu list':
    found = FALSE
    repeat until found:
        /*curr means current*/
        curr_node_ptr = curr_node_ptr->supermenu_ptr /*consider
higher level*/
        if curr_node_ptr->next_submenu exists
        then /*take next menu item*/
            curr_node_ptr = curr_node_ptr->next_menu_ptr
            found = TRUE
        else /*last menu item is reached*/
            if curr_node_ptr->supermenu_ptr exists
            then /*repeat the same on higher level*/
                curr_node_ptr = curr_node_ptr->supermenu_ptr
                found = TRUE
            else /*root level is reached*/
                /*wrap around -> display first menu item */
                curr_node_ptr = root_node_ptr->first_submenu_ptr
                found = TRUE
            end
        end
    end of repeat
    display menu item corresponding with curr_node_ptr
end of switch

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## Claims

1. A device controllable by a menu to be passed through sequentially, having a display device for menu selection objects, a device for selecting an indicated menu selection object, a device for effecting a transition to a subsequent menu selection object, and having a tree-structured menu of hierarchically structured menu lists with menu selection objects which, in turn, may be menu lists, characterized in that at least one menu list contains a menu selection object, the

selection of which effects a direct jump to the next menu selection object of the next highest level.

2. A device as recited in Claim 1 in which at least one menu list contains a menu selection object (End), the selection of which effects a jump to the first menu selection object of the hierarchically highest level (main menu).

3. A device as recited in one of the previous claims, whereby at least one menu list contains a menu selection object, the selection of which effects a direct jump to the previous menu selection object of the next highest level.

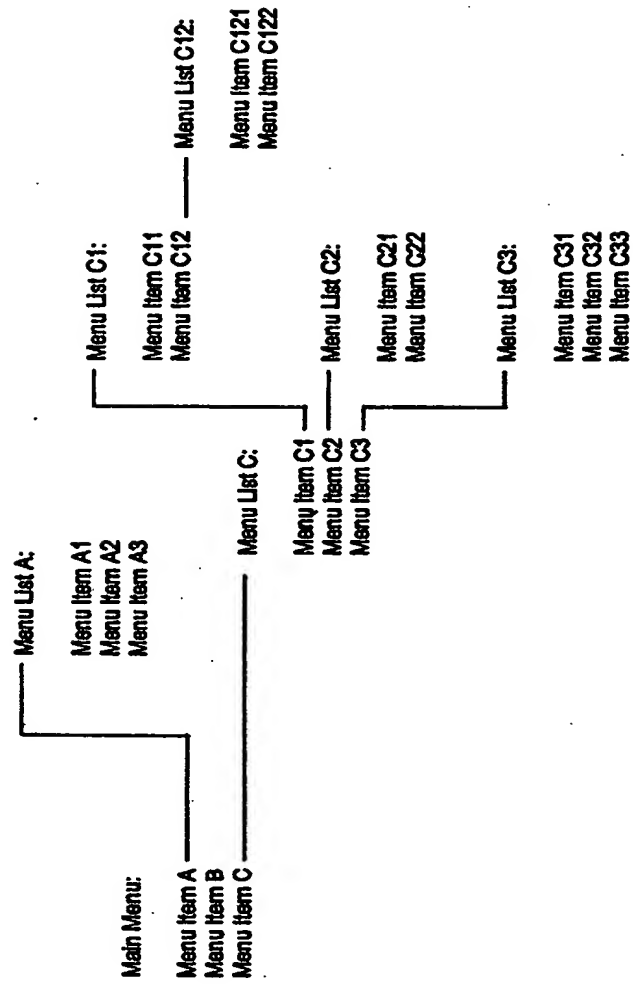
4. A device as recited in one of the previous claims having a data storage unit, in which a data structure is stored, in which a data set is assigned to each menu selection object of a menu list, said data set including the menu selection object data, a pointer to the data set of the hierarchically next higher menu list, a pointer to the data set of the next menu selection object and - if this menu selection object is, in turn, a menu list -- a pointer to the data set of the first menu selection object of the current menu list.

5. A method for sequential menu control, wherein at least one menu list of a hierarchical menu structure contains a menu selection object, the selection of which effects a direct jump to the next or previous menu selection object of the next highest level.

6. A method as recited in Claim 5, wherein a data storage unit contains a data structure, in which to each menu selection object of a

menu list a data set is assigned, which includes the menu selection object data, a pointer to the data set of the hierarchically next higher menu list, a pointer to the data set of the next menu selection object, and - if this menu selection object is, in turn, a menu list - a pointer to the data set of the first menu selection object of the current menu list.

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7 pages of figures attached  
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**Fig. 1**

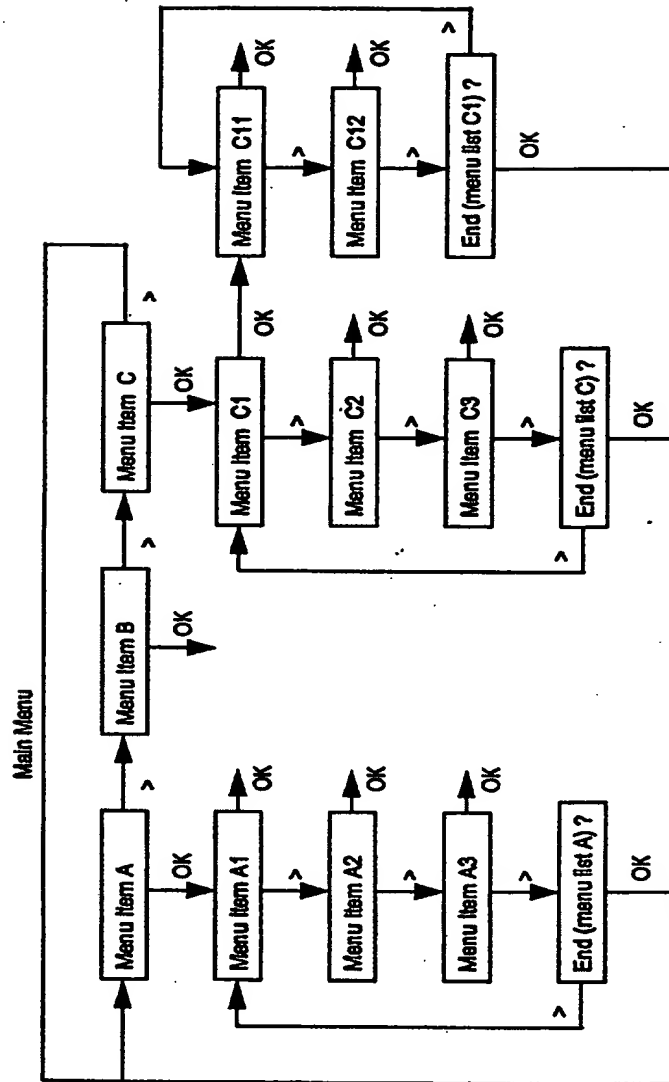
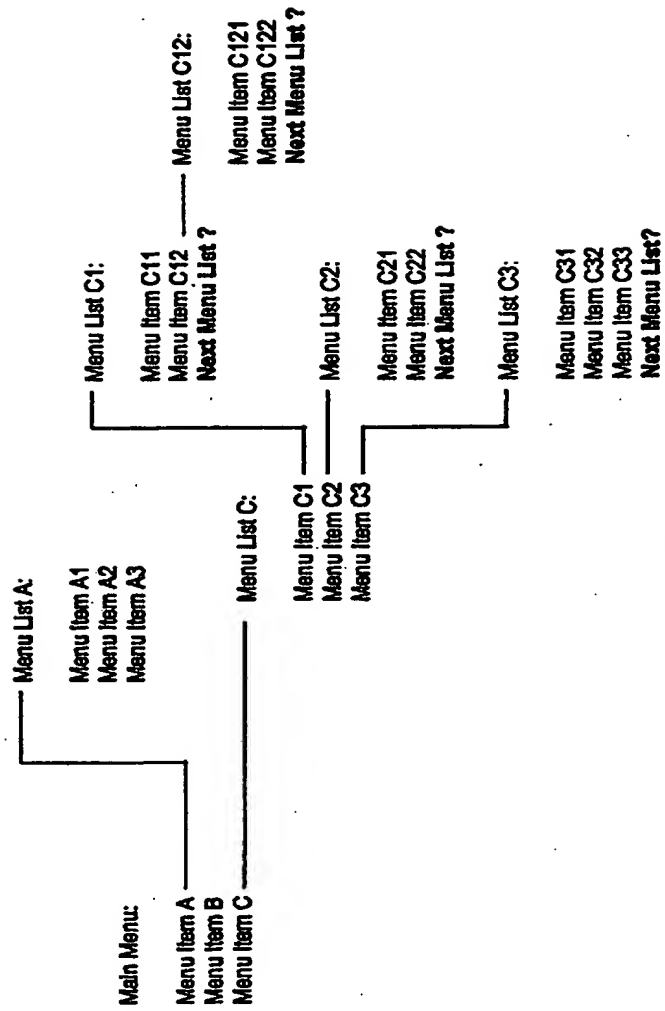
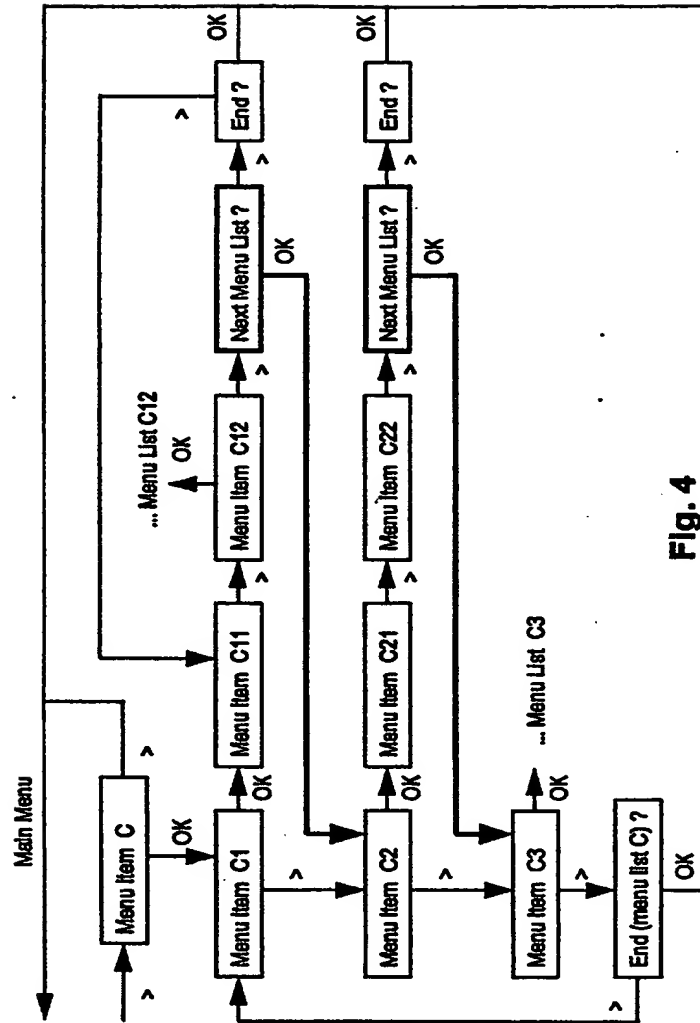


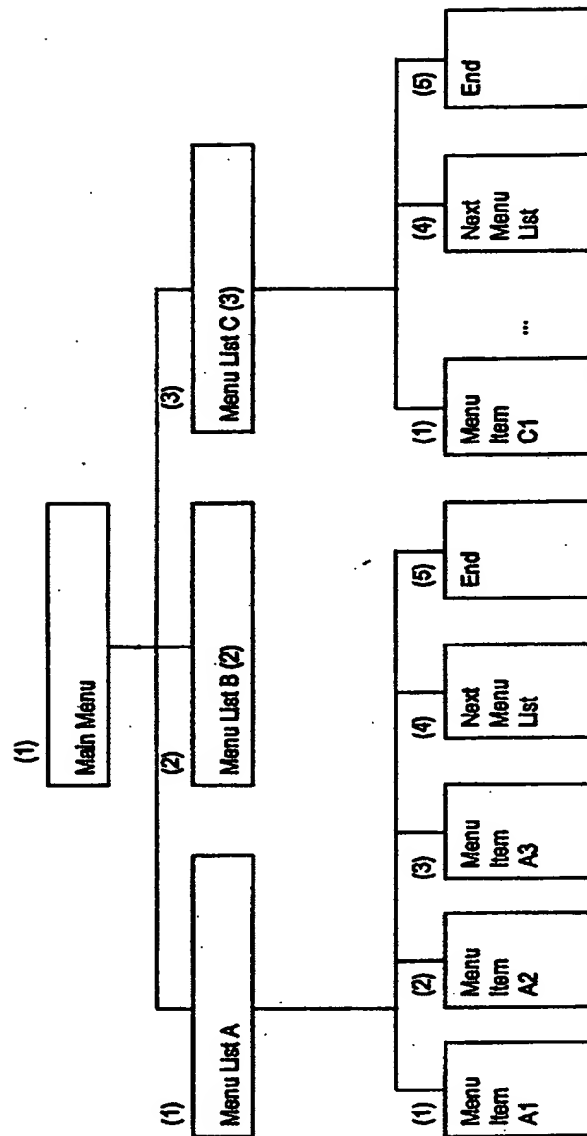
Fig. 2





**Fig. 3**





**Fig. 6**

supermenu_ptr
menu data
next_menu_ptr
first_submenu_ptr

**Fig. 6**

